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ROCKY MOUNTAIN FOREST AND RANGE EXPERIMENT STATION

A Portable Light Table for Field Interpretation of Aerial Photographs

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Interpretation of aerial photography often requires on-site investigation of the surface features imaged on the photos. A portable light table that accommodates two, 70 mm. film spools or one 9- by 9-inch transparency, was constructed. The unit is powered by self-contained rechargeable batteries or from external 115 VAC or 12 VDC sources.

KEY WORDS: Aerial photography, light table.

Interpretation of photographs taken from aircraft or earth-orbiting satellites often requires on-the-ground investigation of the area being studied to assure positive identification of specific targets. Due to losses in image quality when photos are duplicated or printed, it is desirable to use the original film transparencies in these investigations.

To aid in field interpretation of aerial photographs, a battery-powered, rechargeable light table was constructed. The table was specifically designed to display 70 mm. film transparencies, since this film size is most often used in photographs from satellites and from aircraft when large-scale imagery is required for individual object identification or for sampling purposes (Aldrich 1966, Driscoll 1969).

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Description

The light table (fig. 1) was designed to accommodate two 70 mm. film rolls simultaneously, to permit field comparison of imagery obtained on two different film types. The viewing stage is an 8- by 8-inch area of opaque, acrylic plastic (fig. 2) illuminated by six fluorescent tubes. These tubes may be operated three or six at a time, thus lighting half or all of the viewing surface. Field power is supplied by a built-in, 12-volt, rechargeable battery pack which will power the light source for up to approximately 1 hour of continuous use. The table may also be operated from any 115 VAC 60-cycle line, or from an external 12 VDC supply. An accessory cord, provided with the table, may be plugged into any automotive cigarette lighter outlet for operation in this mode. A hi/lo light intensity control permits a reduction in power consumption when brightest lighting is not required. A battery charger built into the unit allows recharging where-

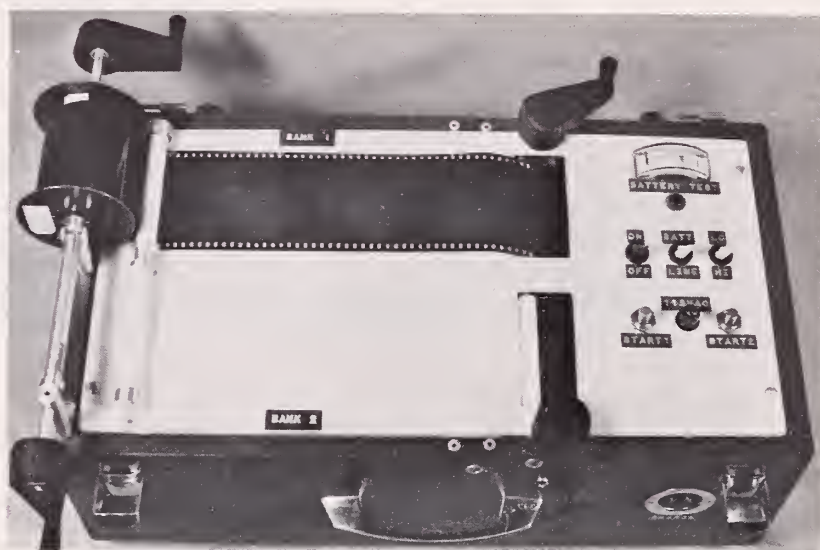


Figure 1.--

The light table can accommodate two reels of 70 mm. film or one 9- by 9-inch transparency.

Figure 2.--

Power for the six fluorescent tubes may be supplied by a built-in rechargeable battery pack, from an external 12-volt battery, or from any 115-volt outlet.



ever standard 115 VAC power is available. The unit measures 7½ by 9½ by 16½ inches, and weighs about 22 pounds.

Construction Details

The battery pack consists of ten 1.2-volt nickel-cadmium cells, factory assembled in a series network to provide a 12.5 volt pack (G.E. Type 10GR4).² A 12 VDC/115 VAC power inverter is used to provide the 115 VAC required for the fluorescent tubes.

The unit is wired as shown in figure 3. The use of battery or external 115-volt power

is controlled with a toggle switch, S3. If battery power is used, the inverter is then turned on with another toggle switch, S2. In either battery or external mode, 115 VAC is indicated by the panel lamp, L1.

The fluorescent tubes are started in two groups of three with switches S5 and S6. The switches are held for 3 to 5 seconds, then released. Once in operation, power may be conserved by switching the hi/lo intensity switch to "lo" position. This switch (S4) places a 200-ohm, 50-watt resistor in series with the fluorescent tubes.

The film takeup reels, located underneath the viewing stage (fig. 4), are standard, 50-foot 70 mm. film spools, with small spines protruding from the centers which provide for automatic film takeup. The spines were formed by bending out a small area of the aluminum center

²Trade and company names are used for the benefit of the reader, and do not constitute endorsement or preferential treatment by the U. S. Department of Agriculture.

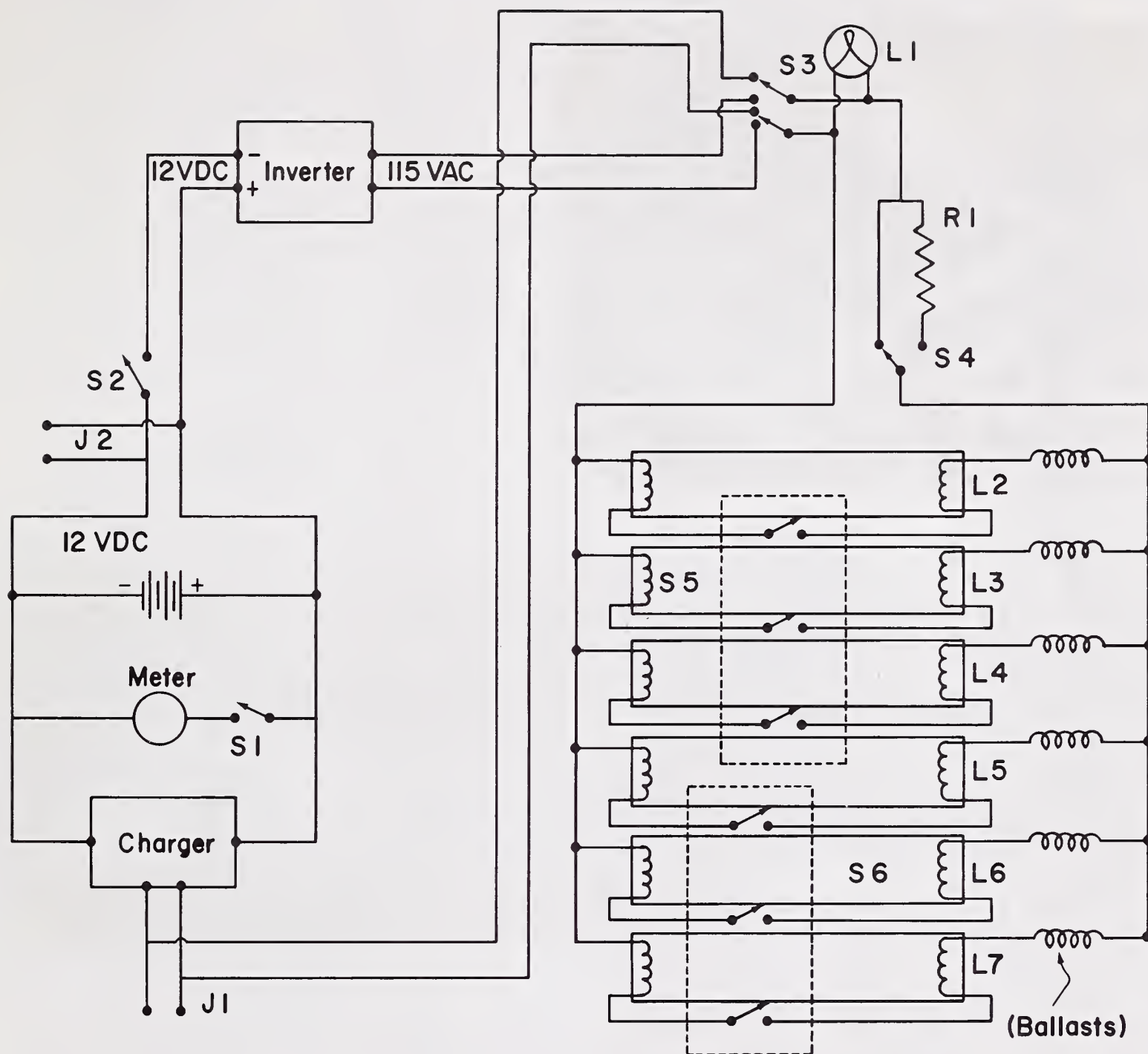


Figure 3.--Circuit diagram and parts list for portable light table.

S1--Battery Test Switch, SPST, N.O., pushbutton.
 S2--Inverter on/off Switch, SPST, toggle.
 S3--Internal/External 115 VAC Switch, DPDT, toggle.
 S4--Hi/Lo Light Intensity Switch, DPST, toggle.
 S5, S6--Fluorescent Tube Starters, TPST, N.O., pushbutton.
 R1--200 ohm, 50 watt.
 L1--Panel Lamp, neon.

J1--115 VAC Connection.
 J2--External 12 VDC Connection.
 L2, L3, L4, L5, L6, L7--Fluorescent Tubes, G. E. Type F6T5CW.
 Ballasts--40 watt, G. E. Type L-140F.
 Battery--12.50 volts, 4.4 amp-hour, G. E. Type 10GR4.
 Meter--0-15 VDC.
 Charger--500 MA, Electronic Components Co., Type 10-500.
 Inverter--12 VDC to 115 VAC.

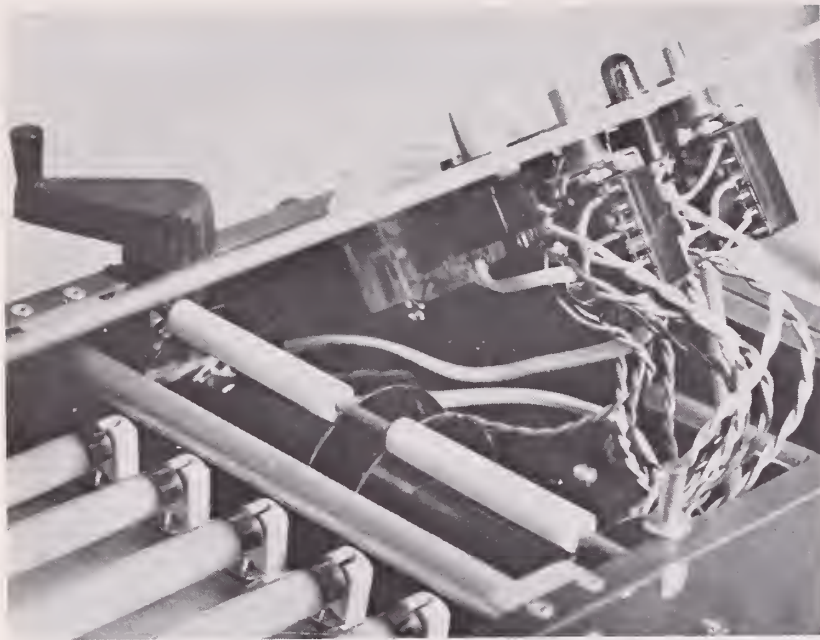


Figure 4.--

The automatic film takeup
reels are located beneath
the viewing stage.

spindle with needle-nosed pliers, then filing to produce the desired size and shape. In operation, the end of each film roll is inserted into the takeup slot, and the takeup reels turned slowly, allowing the spines to engage the sprocket holes in the film. Two right-angle gear drive units are used to couple the takeup reels to the hand cranks. The film feed reels are positioned on removable shafts, which are stored in the lid when not in use.

The film rollers were made from teflon rod, an ideal material for this purpose because of its "self-lubricating" characteristic.

Discussion

The design of the field light table could be modified in a number of ways to better suit any specific application. The nickel-cadmium batteries could be replaced by standard carbon-zinc (nonrechargeable) batteries, at considerable cost savings. Or, batteries could be omitted entirely, in favor of using vehicle (12 VDC) power.

If only one or two fluorescent tubes are needed, the 12 VDC/115 VAC inverter could be replaced by "inverter-ballasts," that develop 115 VAC from 12 VDC for each fluorescent tube separately. The total current drain in either case is the critical factor. When six fluorescent tubes are used, it is more economical, in terms of power consumption, to use the separate inverter.

The film transport system is not discussed in detail because its design would probably depend on the individual application and on the shop facilities available for its construction.

Two very useful accessories to the light table are a stereoscope and a viewing hood. The stereoscope used was a 2-power model which simply rested on the viewing stage. The hood was made of a piece of black corduroy large enough to cover the user's head while at the light table, thus excluding glare from the sun. Among other accessories which could be added are a tripod mount, and a glass plate for holding the film flat against the viewing stage. The viewing stage is sufficiently large to provide single-frame interpretation of larger aerial photographs, up to 9 by 9 inches. This feature is very useful when 70 mm. photographs are used in conjunction with larger format, smaller scale imagery in sampling problems.

The model described is a prototype, and therefore the cost of construction may not be representative. It is expected, however, that the cost of materials to make a similar light table would be about \$250, depending on local prices.

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